EXAMINING THE FACTORS OF QUALITY OF LIFE – A CASE STUDY IN
BUDAPEST

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Abstract. After a brief introduction describing the urban environment of Budapest, the local differences in the quality of life are characterized by means of an index derived from the broadest set of variables that are available for the 23 districts of the Hungarian capital. The concept of HDI is also adapted to the urban districts and by regressing its value against property prices, an extremely strong correlation could be revealed. Out of the components of HDI, the education level of the resident population appears to be most closely connected with the property values. By disaggregating the real estate transactions database of the years 2005 and 2006 according to street addresses in the hilly Buda districts, it is possible to assess the impact of altitude on the residential property values. The mean price related to unit floor area of the apartments reaches a peak at a height of 200 meter above sea level where favourable environmental attributes, like proximity to open space and visual amenities are coupled with prestigious image and high status of the population. Beyond the natural endowment, the scarcity of land available for housing in the Buda Hills and high construction costs due to the physiography are also capitalised in the property values. Conclusions bearing relevance to urban planning are summarized in a SWOT analysis at the end of the paper.

Keywords: Budapest - HDI - Urban environment - Quality of life - Property prices - SWOT analysis

1. Introduction

Budapest with its 1.7 million inhabitants is one of the biggest and economically most dynamic cities in East Central Europe and stands out as the undisputable political, administrative and cultural center of Hungary. It lies on the banks of the Danube River which is crossing the city in north-south direction, thus dividing it into a western (Buda) and eastern (Pest) part. The west side is flat, and the unimpeded spread of the built-up area has resulted in a quite regular morphological pattern which can easily be described by the Park, R. E. & Burgess, E. W. & Mckenzie, R. D. (1925) model of concentric zones. The city center (CBD) is surrounded by the densely built–up inner residential belt containing mostly dilapidated housing stock from the late 19th and early 20th century interspersed with neighbourhoods in different stages of renewal. The zone of transition consists of large derelict industrial areas and huge, monotonous housing estates with prefab high–rise buildings of the state socialist era. Giant housing estates appear also in the outer residential belt of former suburbs that were joined to the capital in 1950; these are characterised, however, by the dominance of detached family houses.

On the west (Buda) side of the Danube River the somewhat delayed development and the emerging irregular pattern of the city has been due to the complicated orography. The Buda Hills rise to an altitude of more than 500 meter (that is about 400 meter above the Danube valley). The hilltops and the upper parts of the slopes are still covered by recreational forests forming a nature protection area, while most of the slopes were built up during the last century with good quality 4–5–storey houses surrounded by greens. High density residential areas and large housing estates appear only on the foothills and the minor plains adjacent to the Danube River. In the Buda Hills the urban climate is mitigated by the altitude: the population living there suffers much less from the summer heat while it can enjoy more sunshine and snow in the winter. Due to the prevailing westerly winds, the air is much cleaner on the Buda side, and severe air pollution is restricted to the key traffic routes that follow the main valleys. There is abundant evidence provided by recent polls that the Buda districts have the highest prestige and stand out among the favourite target locations of those intending to move while there are only few people willing to
leave Buda for the sake of a new dwelling in Pest. The equally easy access to the nature and the city center, the various amenities provided by the Buda Hills’ environment as well as those of the Danube riverbanks mean remarkable assets for the Hungarian capital even in the international competition of cities, since supply of quality dwellings and environmental issues rank high among the priorities of postmodern societies.

Due to the political turn in 1990 the bulk of the housing stock of Budapest that had been owned by the state was transferred to the municipalities (districts) which have sold most of the apartments to the sitting tenants; thus, the share of the publicly owned rented apartments has decreased to merely 6 per cent out of the total of 860 000 dwellings. The privately owned apartments of the multi-storey buildings are managed usually in the form of a condominium.

The emerging vigorous housing market of Budapest and the development processes due to the economic transformation of Hungary raised international interest in the urban research community producing a lot of valuable publications on those subjects. Most of them deal with the changing ecological structure, the growing social differentiation and segregation (e.g. Kovács, Z. 1998, Kovács, Z. & Wiessner, R. 1999, Kovács, Z. & Székely, J. 2004), while others focus on the problem areas of housing estates and inner city neighbourhoods (FÖLDI, ZS. 2006, FÖLDI, ZS. & VÁN VEESEP, J. 2007) or provide a general perspective on the restructuring metropolises (BÉLUSZKY, P. & TIMÁR, J. 1992, KOVÁCS, Z. & WIESSNER, R. 2004).

Analyses of the spatial structure of the real estate market and the socio-economic background of the actual property prices were recently undertaken by Kauko, T. (2007a, 2007b). Based on the sophisticated evaluation of nine expert interviews he came to the conclusion that the socio-economic status of the neighbourhood is the most important factor determining the dwelling values in Budapest, whereas only marginal role can be ascribed to the accessibility and service infrastructure (KAUKO, T. 2007b). Surprisingly little has been done till now, however, in order to establish the considerable local differences in the quality of life that are partly due to the attributes of physical and social environment as well as to unveil their bearing upon property prices in Budapest. After a brief outline of some theoretical issues, these problems are to be addressed here by taking a simple statistical analytic approach.

The primary objective of our study is the illumination of the contexts of the property market and the quality of life in Budapest, with a strange look at this question’s significance in terms of the city planning. In the course of our investigation we looked for the answers for the following questions:

- How can the favourable natural conditions prevail in the quality of life?
- What kind of contexts can be experienced in the local differences of the property prices and the quality of life?
- How should the favourable natural conditions influence the property prices?

2. The determinants of urban quality of life

The study of Quality of Life (QOL) has attracted an ever increasing interest over the past three decades, particularly in the areas of medicine, as well as in social studies, but also in social geography and urban studies. The study of quality of life is an examination of various impacts upon the goodness and meaning in life, as well as people's happiness and well-being (McCall, S. 1975). Recognising both of the objective and the subjective dimensions of quality of life is a key to understanding what parameters/attributes can be used to measure it (GILLINGHAM, R. & REECE, W. S. 1979; WILLIAMS, A. 1999, ALLARDT, E. 1993). Objective quality of life is about fulfilling the societal and cultural demands for material wealth, social status and physical well-being (NORRENFEET, L. 1993), while subjective quality of life is about feeling good and being satisfied with things in general (ARGILE, M. 1996). Thus, quality of life is a descriptive term that refers to people’s emotional, social and physical well-being, and their ability to function in the ordinary tasks of living (BERGER-SMITT, R. & NOLL, H. 2000).

Recent initiatives emphasize the importance of environment in urban quality of life and share an interest in the ways people’s satisfaction with their lives are influenced by the local social and physical environment...
environmental context of quality of life resulted in an increased effort to find objective appropriate social indicators to measure the “reality” of the living environment (e.g. Stover, M. E. & Leven, C. L. 1992; Sufian, A. J. M. 1993; Rogerson, R. J. 1999) in this respect, the term quality of life is being used to characterise the relation to the shared environment in which people live [HELBURN, N. 1982].

From our perspective, quality of life may be defined as objective measure of welfare which largely depends on the different environmental conditions in urban areas.

According the multidimensional model underlying to this study (Figure 1) quality of life is the product of the interplay among socio-economic, health, personal and environmental conditions which affect human and social development. The approach to the measurement of the quality of life derives from the position that there are a number of attributes influencing actual living conditions, thus, contributing to one's overall assessment of the quality of life.

These factors are due to the multivariable relationships between the individual and his/her physical and social environment.

3. Research background of the role of property prices in the urban environment

We may deduce from the establishment of the estate prices (its regional change) and the theories concerning the cities' area usage, that the researchers are concerned for a long time about the regional change of the estate prices and their causality explanation. Alonso applied Thünen’s basis model (appeared in 1826) and drew it up in his monocentric city model [ALONSO, W. 1964]. The model was refined long by Muth, R. F. (1969) and Mills, E. S. (1972). After the authors, by Alonso turned into known as an AMM model theory, in more, for example in this manner Fujita, M. (1989) and Henderson, J. V. (1996) continued to improve it.

The increase of the cities’ regional spreading, rising their economic strength made necessary involving newer factors like that in the city model, that yielded extension, continuing to improve and transformation of the monocentric city model. McDonald, J. F. (1987), then Plaut, P. O. and Plaut, S. E. (1987), Stutz, F. P. – but Policentric city model sketched by De Souza, A. R. (1989) and others primarily and quasi exclusively took economic viewpoints into consideration in terms of its establishment of the estate prices, the establishment of the demand and supply. It was the models' fundamental deficiency that it was not taken into consideration the geographical environment differing locally, and the distorting effects of the different historical–economic development.

From the 1990s increasingly more people brought up the effects of the factors above...
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onto a distorting, urban area usage - in this manner the estate price. [ANAS, A. & KIM, I. 1996; McCANN, P. 2001; AHLFELDT, G. M. 2007; AHLFELDT, G. M. & WENDLAND, N. 2008]. The natural environment, the quality of life made a step as a town-development factor became a determining factor on the neighbourhood of the turn of the millennium.

Economists, economic specialists drew up the delight (hedonic) or hedonist concept of a price [MOHAN, M. 1992], and this hedonic price modelling can use to define the environmental effects in housing prices. Especially important this in cities like that (in this manner for example on Budapest), where the prices of the same quality estates differ significantly on areas with different environment. Investigating the effect of natural endowments on house values raises the fundamental issue of the functional form of the hedonic function. In this manner sinks into the establishment the role of the natural environment and the quality of life of the real estate prices [IZSÁK, É. & PROBÁLD, F. & UZZOLI, A. 2007].

4. The connection between quality of life and property prices

The urban environment insures special life conditions that influence the local population's quality of life. In the later decades the tercier and the kvaterner sector coming into the foreground, and the significance of those natural conditions appreciated in value owing to the increase of the environmental claims of the residence functions, that directly or indirectly – through their socio-economic effects – the population's quality of life is influenced.

The state of the residence environment – in a considerable part budding from the different natural conditions –, from distance measured from the city centre and like this its accessibility, and its social prestige – which can difficultly separated from all of this – reflected on a complex manner the establishment of the property prices.

On the one hand we used in our analysis the Human Development Index (HDI) – on the examining level of Budapest's district – for the measurement of the quality of life. It is based on the taxable income per capita, the average life expectancy at birth and percentage of the population with tertiary level education completed. These indicators [CENSUS, 2001] were aggregating, and HDI was calculating according to the well-known HDI form applied to Budapest's circumstances. For each of the three components of HDI, for example:

\[ \frac{a_i - a_{\text{min}}}{a_{\text{max}} - a_{\text{min}}} \]

where \( a \) = life expectancy at birth (years), \( b \) = percentage of the population aged 25 and above with tertiary level education completed (%), \( c \) = taxable income per capita (thousand forint)

The local differences of quality of life based on HDI (Figure 2) prove unambiguously Buda’s favourable, while Pest's unfavourable position. In Buda the most advantageous residence environment among all Budapest districts can be found in Budapest's historical castle quarter (I district), and also in the highland quarters (II and XII. district).

![Figure 2. The values of HDI in Budapest, 2001](image)

The situation is more differentiated in Pest. The inner city districts concerned by the segregation (VI, VII, VIII), or the most depreciated industrial areas after the transformation (e.g. X) are in the most harmful situation. At the same time the city of Budapest (V district), by way of the block rehabilitation much or less affected IX district, or the XIV district in the greenbelt.
and the XVII district with detaches houses, or the „investment-friend” XIII district are in more favourable situation in Pest (based on HDI). On the other hand this more favourable situation is relative, because HDI values in a considerable measure lag behind Buda’s districts. Besides of applying HDI we also calculated an own made aggregated index to measure the differences of quality of life in Budapest. The objective factors of this aggregated index (as in Figure 1) based on the data of census 2001 and all of them was classified into three groups:

− The factors of Socio–Economic Situation: e.g. taxable income, population with tertiary level education, percentage of unemployment, employers and physical workers etc.

− Environmental factors: as housing environment (e.g. percentage of occupied dwellings without amenities, persons per room, living area etc.) and natural environment (e.g. the proportion of public parks and green areas in the residential area).

− The factors of health status: e.g. average life expectancy at birth, infant and adult mortality rate, socio–demographic factors (as ageing rate, percentage of never married men and women etc.).

We previously decided in the case of each single examined index that the low or the high values can indicate the more favourable status, and we ranked the districts from more favourable values to the unfavourable values. So all district could get a ranking position by the examined factors, which showed more advantageous position at the top levels of the ranking list (e.g. 1, 2, 3 etc.), while at the bottom levels of this ranking list indicated the more disadvantageous position of the district (e.g. 21, 22, 23). Finally we totalized all of these ranking positions and we obtained the aggregated index of the examined district. The lower values of this aggregated index could indicate the higher socio–economic status, or the more valuable housing environment or the better health conditions of the examined district, so on the whole the more favourable quality of life. On the map of the aggregated index (Figure 3) we categorized all values of 23 districts into five groups, so on the scale – between the most favourable and the most unfavourable values – we could examine in detail the local differences of the quality of life in the capital.

In comparison with Fig. 2 and Fig. 3 the spatial structure of quality of life in Budapest is so similar by the aggregated index and by HDI: the higher values of HDI follow the very advantageous position of Buda districts, while in the centre of Pest the lower values of HDI and the very disadvantageous position of its districts can indicate the typical social and environmental problems of this area of Budapest. By the objective factors of the aggregated index we can see that the highest level of quality of life can be found in those district of Buda where from more viewpoints the most favourable housing environment resulted the highest property prices in Budapest in the past decades. That was the main cause to apply property prices examining the local disparities of quality of life and the connection between them was realized by correlational calculations. The prices of property trading – what was the basis of the assessment of charges – were taken from databank about apartment prices of Hungary (KSH 2007). So in our examination we took the square metre price of condominiums (not panel) as a starting point, because this is the only flat type, which can be found in all district of Budapest. The disadvantage of their application that from the property databank emerges only that in an optional street how many same property type was sold in the examined year, and calculated average square metre price can refer to the selected street from these transactions. So it does not come out for example whether there are considerable price differences in the value of the property in the case of the longer roads.
By regressing HDI value against property prices, an extremely strong correlation could be revealed (Figure 4). Out of the components of HDI the education level of the resident population appears to be most closely connected with the property prices \( r = 0.9214 \), while the other components are also in close connection with the property prices \( r = 0.8356 \) as life expectancy and \( r = 0.8145 \) as taxable income. On the other hand not only HDI, but also in the case of our aggregated index can experience similarly high value of the Pearson’s coefficient \( r = 0.7533 \). Figure 4 can also show the influence of measured distance from city centre looks unimportant.

**Figure 4.** Connection between property price and HDI in Budapest, 2006

Proceeding from the hedonic pricing concept (e.g. Des Rosiers, F. & Thériault, M. 2006), we also examined the measured distance from the city centre’s effect on property prices. In our calculations we defined as city centre the geographical point of 0 kilometre-stone that can be found in Buda (I. district). We proceed with the help of an Internet surface (www.utvonalterv.hu) and calculated the distance of the district from this central point. On the course of this examining we were looking for two geographical points in the larger districts which can be found in densely lived parts of the district next to transport junctions. So, one point was indicated at the closest part to the city centre, while the other one was selected in its farther part. In the smaller districts (e.g. I., V.) we selected only one geographical point. We get the Internet route designer to calculate the availability of marked geographical points from the measured distance (km) of the city centre with public transport vehicles, with cars and on foot. Finally, averaging the received values we were able to define the measured distance of the district from the city centre.

So obtained datas were suitable for be the basis for make multiple variable regression calculations for interpretation of the connections of the property price, HDI and the measured distance from the city centre. Our most important result was that the measured distance from the city centre and HDI collectively in cca. 85.9% explains the differences of the property prices in Budapest.

**Model summary**

\[
Y = b_0 + b_1 \times x_1 + b_2 \times x_2
\]

Property price = 219.842 + 59.321*HDI - 3.088*Distance

\( y \) = Average property price of condominiums (thousand forint/m\(^2\)) – dependent variable
\( b_0 \) = 219.842 – Constant
\( b_1 \) = 59.321
\( b_2 \) = -3.088
\( x_1 \) = HDI
\( x_2 \) = measured distance from the city centre
Merely, the HDI in the case of simple binary regression in 75.1%, while likewise merely the measured distance from the city centre, in the case of linear regression only in 30% explains the local differences of the property prices. Accordingly the hedonic pricing is the basic principle prevails on a specific manner in Budapest, besides of the distance from the city centre thus the role of the defined distance (as Alonso−model) was found secondary, almost neglected by us.

In the knowledge of the honed sketched contexts we selected two sample areas in Buda highlands (II and XII district), where the natural factors, or the determining role of the natural endowments on an act can be ripened in the connection between quality of life and property prices, and for this significant role attributable in the establishment of the city construction.

5. The role of hilly terrain in the quality of life of buda districts

The typical districts with hilly terrain are in Buda (II, XII district), where we examined the role of natural endowments as highland in the quality of life and its manifestation in the real estate prices. As our district level examinations show, these Buda districts stands out with their high values of HDI and property prices. These districts are the same quarters which can be characterize with an attractive image outstandingly appear as the most preferred potential mobility target area inside the capital. The claim for the suitable environment is especially stressed in the settlement of research and development activities [KOVÁCS Z. ET AL. 2008].

For the classificatin how the Buda Hills’s natural conditions influences the quality of life and property prices – what are the basis of the assessment of charges–, we digested the property datas set implying the Hungary apartment prices (KSH 2007) in the II. and XII. district, of condominiums – not panel – in 2005 and 2006. We grouped the transactions according to the altitude of the condominiums above the sea level, and calculated the average square metre price in 20 metre altitude interval. The databank indicates only the street name of the property serving as the object of sale and purchause, and because of this we may have involved only that streets in the examination which full length falls into a narrower altitude interval than 20 metres. From the altogether 3123 data (transactions) analysis (Figure 5) unambiguous, that the square metre price of the condominiums shows a monotonous linear increase from 100 m to approximately 200 m altitude of sea level: 10 metre altitude differences increase the price of the condominiums by averagely 10,000 forint/m².

![Figure 5. The changes of property price according to altitude in the 2nd and the 12th district in 2005/2006](image-url)
according to our results and experiences – can be summarized in the following points:

a. The topographic features and the local climatic conditions being attached to it mean the prime cause. The Buda Hills have the clearest air on the capital's area, where the quality of the air improves proportionally by the altitude above the sea level; the noisy main roads with contaminated air run in the valleys and on the lower terrains. (These are definitely cheaper facing with the crossing side streets). The climatic benefits that counterpointing the city climate are also attached to the altitude (in winter more sunlight, heat occurring on summer more rarely [PROBALD, F. 1974]). The proximity of the greeneries, and the aesthetic value of the landscape, the panorama overlooking the highlands and the city is also realized on the areas with a higher position.

b. As the secondary factor raising the market value of the properties on the highlands is the higher specific building expenses purchasable into calculation. (These are secondary, because it would not be worthy concerned rewarding to build between the complicated land features in the case of lacking benefits and amenities mentioned in dot a.) The limited expansion of the area at which the beneficial natural conditions are, that is scant supply is likewise a value raising factor. The latter one is evidenced by the exponent regression (Figure 6) which can be manifested between the number of the transactions and the altitude above the sea level; the decrease between 100–200 m altitude interval is the fastest one.

c. Tertiary – because it follows from the former ones – factor is the favourable social environment of the highland districts, its high social status, that the census data justify (KSH 2007), furthermore – with this in a tight context – the image of areas that tooken shape historically. In this can search the capital reason of the property prices change hardly above 200 m peak value: because here are the patinated garden suburbs (Zöldmál, Rézmál, Rózsadomb, Németvölgy, Orbánhegy) that are very close to the city centre and offering the most beautiful panorama. In a higher sea level altitude the increasing disadvantages (heavier accessibility, scant public transport and commercial network) – is appearing (According to our opinion the basis of the dues imposition is not always equal to the property prices, which is especially true for this altitude level. However naturally it is not possible to prove this context with present empirical examination methods) – impede the additional raising of prices.

![Figure 6. Number of transactions according to altitude in the 2nd and the 12th district in 2005/2006](image)
We may establish on the base of our examinations made on our sample areas that the status of housing environment and its social prestige manage a determining role in the establishment of quality of life in Budapest, and in its local differences.

6. The SWOT analysis

The most important conclusions of our studies are summarized in the aspect of the city development strategy, considering the connections between the natural environment in the city and the quality of life, in a SWOT-analysis.

On the one hand in the course of the SWOT–analysis we took into consideration our examination results, on the other hand our experiences obtained at property distributor firms, third the most important statements of the metropolitan planning documents and the district plans of regulation. With the application of the method our aim was presenting the role of local and positional energies developing Budapest's city construction in the function of the present urban environment. In the course of the summary of our knowledge several environmental conflicts and a contradiction got to illumination, what may define Budapest's international competitiveness in a considerable measure in the future.

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<th>Strengths</th>
<th>Weaknesses</th>
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<td>- diversity of relief is a huge advantage for Budapest in the international competition (the determining parts of the cityscape, the view, various utilizable possibilities)</td>
<td>- the extension of these advantageous natural makings are very narrow, and so there is a certain pressure from the society, there are on the one hand the population's needs and on the other hand the investors interest (see more at Threats)</td>
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<tr>
<td>- the favourable climate and the fresh air of Buda Hills, and the fact that is close the city center (exceptional possibilities for recreation, sports and free-time activities that has an extremely high potential in the aspect of real estate development)</td>
<td>- many of these favorable recreational possibilities are partly unutilized and/or they’re working with a neglected infrastructural background (for instance the untidy footpaths and lack of attractive and standard services)</td>
</tr>
<tr>
<td>- presence of rare natural attractions (for example the cavern system of Buda or the hot curative thermal springs) are important resources for tourism</td>
<td>- the lack of a well-considered city-development concept which would guarantee the rational utilization of the natural environment</td>
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<th>Opportunities</th>
<th>Threats</th>
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<td>- at certain parts of the hilly terrain the demolition of obsolete buildings would give an opportunity either to high standard, up-to-date housing purposes or holiday and tourism purposes</td>
<td>- expanding residential zones at the expense of near-natural areas</td>
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<td>- a great potential resides in the needless and unutilized institutional locations, such as abandoned barracks</td>
<td>- the frequent modification of the Regional Regulation’s Projects for the sake of higher density of building</td>
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<tr>
<td>- landscape destruction and building operations that are not befitting the landscape (for example, in 1970s the construction of the block-like, high rise buildings)</td>
<td>- high frequency of illegal construction sites and building expansions</td>
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<td>- illegal waste-dumps in landscape under protection</td>
<td>- heavier traffic along the main routes (noise and air pollution)</td>
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7. Conclusions

The special morphology of Budapest (hilly versus flat terrain) and its historical and geographical attributes determine local gap in the property prices. From this paper it has become clear that there are characteristic features of the property prices in Budapest, thus our quality of research could demonstrate its typical spatial differentiations related natural endowments.

Our empirical examinations elucidated the context that the property prices express the quality of life and metastatically the natural and the social environment's effects on a complex manner. The role of the natural conditions asserts itself in the value of the properties, hereby influence the regional differences of the quality of life. Until this time the benefits of the natural factors succeeded to develop only partly. The Buda
highlands manage a serious development potential, though there are not enough guarantees for the perspectivewise reasonable utilisation and the manage of the natural values does not receive proper attention.

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